WE CLAIM:

1. A filter bank for processing a baseband signal of a received continuous phase modulated signal with an integer modulation index, the filter bank having filter bank outputs for providing a plurality of decision variable values each representing a likelihood value of a symbol, from a group of predefined symbols that are likely to be present in the continuous phase modulated signal, said filter bank having filter units each having an impulse response determined by a complex main pulse containing a majority of signal energy of one of the predefined symbols that is likely to be in the continuous phase modulated signal.

2. A filter bank as claimed in claim 1, wherein said filter bank outputs are coupled to a decision module, wherein in use the decision module processes the decision variable values to provide a symbol at the output thereof, the symbol being one of the group of predefined symbols.

3. A filter bank as claimed in claim 2, wherein the decision module in use provides the symbol for non-coherent demodulation based on a largest value of the decision variables.

4. A filter bank as claimed in claim 3, wherein the decision module in use provides the symbol by effecting the calculation:

$$\left| \int_0^{LT} r(t+NT) S_{a_N}^*(t)\,dt \right|$$

wherein $r(t)$ is the baseband signal; $S_{a_N}(t)$ is the complex main pulse associated with symbol a_N in the time interval $[NT,(N+L)T]$; T is the symbol interval; N is an integer time index; and L is the non-constant duration of the continuous phase modulated signal's phase shift function in symbols.

5. A filter bank as claimed in claim 2, wherein the decision module in use provides the symbol for coherent demodulation based on estimated fading channel coefficients and a largest value of the decision variables.

6. A filter bank as claimed in claim 5, wherein the decision module in use provides the symbol by effecting the calculation:

$$(-1)^{Nh}\,\mathrm{Re}\left[C^*(NT)\int_0^{LT} r(t+NT)S^*_{a_N}(t)dt\right]$$

wherein $C(NT)$ is the channel coefficient at time NT; $r(t)$ is the baseband signal; $S_{a_N}(t)$ is the complex main pulse associated with symbol a_N in the time interval $[NT,(N+L)T]$; T is the symbol interval, N is integer time index; and L is the non-constant duration of the continuous phase modulated signal's phase shift function in symbols, and h is the modulation index.

7. A filter bank as claimed in claim 1, wherein said filter bank is a matched filter bank.

8. A filter bank as claimed in claim 1, wherein each of said filter units has an impulse response comprising a window function defined as:

$$\prod_{\substack{i=-L+1 \\ i\neq 0}}^{L-1} \frac{\sin M\varphi(t-iT)}{M\sin\varphi(t-iT)}$$

wherein M is the number of all possible symbols in the continuous phase modulated signal, T is the symbol interval, and $\varphi(t)$ is the phase shift function.

9. A filter bank as claimed in claim 8, wherein, said impulse response is also based on a phase shift function $a_N\varphi(t)$.

10. A filter bank as claimed in claim 9, wherein said impulse response is based upon the function:

$$\prod_{\substack{i=-L+1 \\ i\neq 0}}^{L-1} \frac{\sin M\varphi(t-iT)}{M\sin\varphi(t-iT)} \cdot e^{ja_N\varphi(t)}.$$

11. A receiver for receiving a continuous phase modulated signal with an integer modulation index, the receiver comprising:

a filter bank for processing a baseband signal of the continuous phase modulated signal, the filter bank having filter bank outputs for providing a plurality of decision variable values each representing a likelihood value of a symbol, from a group of predefined symbols that are likely to be present in the continuous phase modulated signal, said filter bank having filter units each having an impulse response determined by a complex main pulse containing a majority of signal

energy of one of the predefined symbols that is likely to be in the continuous phase modulated signal; and

a decision module having inputs coupled to the filter bank outputs, wherein in use the decision module processes the decision variable values to provide a symbol at the output thereof, the symbol being one of the group of predefined symbols.

12. A receiver as claimed in claim 11, wherein the decision module in use provides the symbol for non-coherent demodulation based on a largest value of the decision variables.

13. A receiver as claimed in claim 12, wherein the decision module in use provides the symbol by effecting the calculation:

$$\left| \int_{0}^{LT} r(t+NT) S_{a_N}^{*}(t) dt \right|$$

wherein $r(t)$ is the baseband signal; $S_{a_N}(t)$ is the complex main pulse associated with symbol a_N in the time interval $[NT,(N+L)T]$; T is the symbol interval; N is an integer time index; and L is the non-constant duration of the continuous phase modulated signal's phase shift function in symbols.

14. A receiver as claimed in claim 11, wherein the decision module in use provides the symbol for coherent demodulation based on estimated fading channel coefficients and a largest value of the decision variables.

15. A receiver as claimed in claim 14, wherein the decision module in use provides the symbol by effecting the calculation:

$$(-1)^{Nh}\,\mathrm{Re}\left[C^{*}(NT)\int_{0}^{LT} r(t+NT)S_{a_N}^{*}(t)dt\right]$$

wherein $C(NT)$ is the channel coefficient at time NT; $r(t)$ is the baseband signal; $S_{a_N}(t)$ is the complex main pulse associated with symbol a_N in the time interval $[NT,(N+L)T]$; T is the symbol interval, N is integer time index; and L is the non-constant duration of the continuous phase modulated signal's phase shift function in symbols, and h is the modulation index.

16. A receiver as claimed in claim 11, wherein said filter bank is a matched filter bank.

17. A receiver as claimed in claim 11, wherein each of said filter units has an impulse response comprising a window function defined as:

$$\prod_{\substack{i=-L+1 \\ i\neq 0}}^{L-1} \frac{\sin M\varphi(t-iT)}{M\sin\varphi(t-iT)}$$

wherein M is the number of all possible symbols in the continuous phase modulated signal, T is the symbol interval, and $\varphi(t)$ is the phase shift function.

18. A filter bank as claimed in claim 17, wherein, said impulse response is also based on a phase shift function $a_N \varphi(t)$.

19. A filter bank as claimed in claim 18, wherein said impulse response is based upon the function:

$$\prod_{\substack{i=-L+1 \\ i \neq 0}}^{L-1} \frac{\sin M\varphi(t-iT)}{M \sin \varphi(t-iT)} \cdot e^{ja_N \varphi(t)}.$$